Paediatrics

Metabolic risk in children from different ethnic backgrounds

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Ethnicity has a significant impact on disease risk and may also affect response to treatment. The contribution of potentially "modifiable" factors, such as lifestyle, that may work over time, versus inherent differences, such as inborn genetic variables, is as yet not clear. However, we know that significant metabolic differences originate in childhood with data suggesting that, even at birth, children from South Asian backgrounds have altered body habitus compared to white European children with more central fat mass despite a lower body weight (Bavdekar et al, 1999).

The paper by Nightingale et al (summarised alongside) presents data from a large, school-based study from the UK examining metabolic risk in children from different ethnic backgrounds. Over 4600 9–10 year old children had assessments of body fat (BMI, waist circumference, skinfold thickness and bioimpedance) along with a metabolic profile of fasting glucose, HbA_{1c} and a measure of insulin resistance (HOMA-IR).

Participation rates were similar for white Europeans, South Asians, and black African-Caribbeans. There were significant ethnic differences in adiposity and metabolic markers: mean levels of BMI, fat free mass (FFM) and waist circumference were highest in black African-Caribbeans and lowest in South Asians although South Asians and black African-Caribbeans had higher levels of fat mass and fat mass percentage than white Europeans. South Asians had the highest mean levels of HOMA-IR, HbA_{1c} and fasting glucose and black African-Caribbeans had intermediate values. When examining HOMA-IR, positive associations with adiposity markers were apparent in all ethnic groups. However, the slopes relating adiposity markers and HOMA-IR were steeper in South Asians compared with white Europeans by between 20 and 40%. The differences in HOMA-IR between South Asians and white Europeans were apparent even at low levels of adiposity, tended to become more marked at higher levels of adiposity and were statistically significant for all markers of adiposity.

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This study suggests that South Asian children are at increased metabolic risk for lower levels of adiposity and the authors recommend that the prevention of excessive fat gain among South Asian children should be a priority. The authors have already shown that South Asian children in this cohort are less physically active and have poorer quality diets than white European children so it is conceivable that lifestyle interventions could be of great value in these children (Owen et al, 2009). However, given the data from this study it is by no means certain that early weight management strategies would have the same beneficial impact in children from different ethnic backgrounds. Ethnically tailored intervention studies are now needed to identify management strategies for these at risk groups.

Bavdekar A, Yajnik CS, Fall CH et al (1999) Insulin resistance syndrome in 8-year-old Indian children: small at birth, big at 8 years, or both? *Diabetes* **48**: 2422–9

Owen CG, Nightingale CM, Rudnicka AR et al (2009) Ethnic and gender differences in physical activity levels among 9-10-year-old children of White European, South Asian and African-Caribbean origin: the Child Heart Health Study in England (CHASE Study). *Int J Epidemiol* **38**: 1082–93

DIABETES CARE

Metabolic sensitivity to adiposity during childhood

Readability	✓✓✓✓
Applicability to practice	✓✓✓✓
WOW! factor	✓✓✓✓

1 Evidence suggests that ethnic differences in T2D risk originate in early life. Although ethnic differences in metabolic sensitivity to adiposity are thought to exist, these differences have not been investigated during childhood.

2 The authors of the Child Heart and Health Study in England (CHASE) aimed to determine the relationship between adiposity, insulin resistance and glycaemia markers in children aged 9–10 years (n=4633) from different ethnic backgrounds.

3 Adiposity markers including BMI, waist circumference, skinfold thicknesses and bioimpedance were positively correlated to homeostatic model assessment insulin resistance (HOMA-IR) in children from all ethnic groups. This relationship was stronger in South Asian children compared to black African-Caribbean and white European children.

4 The percentage differences in HOMA-IR per standard deviation (SD) increase in fat mass were 37.5 (95% CI, 33.3–41.7%), 29.7 (25.8–33.8%) and 27.0% (22.9–31.2%) respectively (P<0.001).

5 HbA_{1c} was positively correlated to adiposity markers in children from South Asian and black African-Caribbean origins, but this association was not present in white European children.

6 The authors concluded that children from a South Asian origin have an enhanced metabolic sensitivity to adiposity, suggesting that childhood obesity should be targeted in future T2D prevention strategies.

Nightingale CM, Rudnicka AR, Owen CG et al (2013) Influence of adiposity on insulin resistance and glycemia markers among United Kingdom children of South Asian, black African-Caribbean, and white European origin: child heart and health study in England. *Diabetes Care* 11 Jan [Epub ahead of print] ahead of print]

DIABETES CARE

Microstructual changes in the white matter of children with T1D

Readability	✓✓✓✓
Applicability to practice	✓✓✓
WOW! factor	✓✓✓

1 Studies suggest that increased glycaemic excursions during early childhood may influence cognitive performance and brain structure.

2 The authors aimed to investigate the effects of T1D on white matter (WM) microstructure and resultant cognitive behaviour in young children with T1D.

3 Children aged between 3 and 10 years with T1D for at least 6 months (n=22) were recruited into the study alongside sex-matched controls (n=14). Diffusion tensor imaging and neurocognitive tests were completed by both groups and compared.

4 Neurocognitive performance did not differ between the two groups. In children with T1D, higher HbA_{1c} values correlated with reduced intellectual functioning, as measured by the full-scale intelligence quotient (P=0.03).

5 Axial diffusivity (AD) values were lower in temporal and parietal areas of children with T1D (P=0.046) compared to controls. Radial diffusivity (RD) values positively correlated with time-weighted HbA_{1c} levels (P=0.028) in children with T1D.

7 The authors concluded that differences in AD and RD were indicative of significant WM microstructual changes in children with T1D, with these differences being more apparent with higher HbA_{1c} levels. Further studies are needed to determine how WM structure effects cognitive function.

Aye T, Barnea-Goraly N, Ambler C et al (2012) White matter structural differences in young children with type 1 diabetes: a diffusion tensor imaging study. *Diabetes Care* **35**: 2167–73

DIABETES CARE

Childhood infection may increase IA risk

Readability	✓✓✓✓
Applicability to practice	✓✓✓✓
WOW! factor	✓✓✓✓

1 The authors of the Diabetes Autoimmunity Study in the Young investigated the correlation between infection during the first year of life, infant diet and the development of diabetic islet autoimmunity (IA).

2 Illness interviews were conducted during the first 9 months of life in 1729 children. Of these children, 555 had a first-degree relative with T1D and 1174 had no family history of T1D.

3 In total, 109 children developed persistent IA. Increased gastrointestinal (GI) illnesses were associated with a greater risk of IA but only in children exposed to gluten-containing grains before 4 months of age (hazard ratio 1.37 [95% CI, 1.22–1.55]; P<0.0001) or after 7 months of age (1.12 [1.05–1.19]; P=0.0005).

4 The authors concluded that pathogens effecting the GI system such as enteroviruses or rotavirus may enhance IA risk in the presence of diet induced inflammation.

Snell-Bergeon JK, Smith J, Dong F et al (2012) Early childhood infections and the risk of islet autoimmunity. *Diabetes Care* **35**: 2553–8

DIABETOLOGIA

T1D and school: Impact on education

Readability	✓✓✓✓
Applicability to practice	✓✓✓✓
WOW! factor	✓✓✓✓

1 The authors aimed to establish the effects of T1D on educational achievements during compulsory and upper school.

2 Data from 2485 children with T1D and 9940 controls from the Swedish Childhood Diabetes Register were analysed retrospectively. T1D was associated with lower mean final grades in compulsory school (-0.07; P<0.001) and in upper school theoretical programmes (-0.07; P=0.001). Participants with early onset T1D were at a greater disadvantage in compulsory school (-0.15; P=0.001).

3 The authors concluded that a small significant difference existed between the mean final scores of children with T1D compared to controls. This suggests that the special needs of children with T1D need to be considered during school education.

Persson S, Dahlquist G, Gerdtham UG et al (2013) Impact of childhood-onset type 1 diabetes on schooling: a population-based register study. *Diabetologia* 24 Feb [Epub ahead of print]

DIABETES

Gut microbiota differ in children with T1D

Readability	✓✓✓✓
Applicability to practice	✓✓✓✓
WOW! factor	✓✓✓✓

1 The authors aimed to compare the composition of gut microbiota between children with b-cell autoimmunity (n=18) and autoantibody-negative children (n=18) using pyrosequencing. Participants were matched for sex, age, HLA-DQB1 genotype and early feeding history.

2 Microbial diversity was lower in children with T1D. Reduced lactate-producing and butyrate-producing microbiota were associated with b-cell autoimmunity, as well as increased *Bifidobacterium adolescentis* and *Bifidobacterium pseudocatenulatum*. Elevated IgA and fecal calprotectin were not indicative of inflammation in b-cell autoimmunity.

3 The authors concluded that alterations in microbial diversity, which may influence intestinal epithelial barrier function, occur prior to the onset of T1D.

de Goffau MC, Luopajärvi K, Knip M et al (2013) Fecal microbiota composition differs between children with b-cell autoimmunity and those without. *Diabetes* **62**: 1238–44

> *"The authors concluded that differences in Axial diffusivity and Radial diffusivity were indicative of significant white matter microstructual changes in children with T1D, with these differences being more apparent with higher HbA_{1c} levels."*